RPO IMPLEMENTATION AT A UXO SITE

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Introduction

The Arctic Surplus Salvage Yard is a privately owned salvage yard located approximately five miles southeast of Fairbanks, Alaska. The site occupies 24.5 acres and was used to store, salvage, reclaim, and dispose of material mainly from the sale of surplus goods from local military bases. Tracked vehicles, trucks, airplane parts, and metal scrap exist at the site. The scrap volume is estimated to be over 75,000 yd^3. A private residential structure is located in the northwest corner of the property, and a collection of 81 office trailers occupies an area along the northern property boundary. A small pond created from an abandoned gravel pit occupies the northeast corner of the site. An uncapped former military landfill is also located at the site. There are numerous unpaved roads throughout the site, with piles of scrap and salvaged material covering much of the ground between the roads. Trees and shrubs have grown in and around the salvage materials. An eight-foot high concertina wire fence was erected around the perimeter of the site in 1989. Battery processing and transformer scrapping activities at the site contributed significantly to site contamination.

In 1989, a U.S. EPA removal action was implemented at the site, so that sources of contamination were removed or controlled to prevent a further release of contaminants to the environment. During the removal action, a large quantity of asbestos (22,200 lb) and liquid wastes (1,700 drums) were taken off site for proper disposal, a small incinerator, its contents and the contaminated underlying soils were removed, and other small quantities of pesticides (75 gallons of chlordane), and PCBs were removed from the site. In addition, PCB-containing transformers and more than 3,000 empty drums with residual materials inside of them are staged for removal from the site as part of ongoing removal actions. The existing scrap metal was determined not to be a source of contamination at the site. Additional removal actions were conducted at the site in 1990 and 1991, which culminated with a Remedial Investigation (RI) in 1993 and a Feasibility Study in 1995. In addition, a Record of Decision (ROD) was completed for the site in December 1995. PCB and lead contamination is generally widespread throughout the salvage yard. Also, PCBs and lead are the only two site contaminants that have been detected outside of the fenced salvage yard area. Soil samples collected during previous site investigations showed lead levels up to 33,273 milligrams per kilogram (mg/kg), while PCBs levels were reported over 200 mg/kg. These samples were collected at shallow depths and represent near-surface conditions. No significant contaminants levels were detected in the groundwater samples.

The remedy selected in the ROD consisted of the following:

- Relocation of the scrap material to allow access to contaminated soils;
- Excavation of PCB-contaminated soils above industrial cleanup standards (> 10 mg/kg) inside the fence and above residential standards (> 1 mg/kg) outside the fence;
- Treatment via solvent extraction of soils containing > 50 mg/kg PCBs;
- Solidification/stabilization of lead-contaminated soils above industrial cleanup standards (> 1,000 mg/kg) inside the fence and above residential cleanup standards outside the fence;
- Consolidation and capping of the excavated soils on-site; and
- Implementation of institutional controls including long-term monitoring.

Remedial Process Optimization is an iterative and systematic planning tool for evaluating remediation processes to improve risk control effectiveness, site cleanup time and site cleanup costs.

RPO Implementation

A RPO Site Visit (RSV) was conducted at the site in June 2002. The RSV team included representatives from DLA, DRMS, US EPA, ADEC, AFCEE and its contractors. The team reviewed the site history and evaluated various options (including alternative technologies) for optimizing the proposed remedial action (RA). The following recommendations were proposed:

- Conduct additional sampling to delineate extent of PCB and Lead contamination requiring remediation;
- Use solidification/stabilization for remediation of lead and PCB contaminated soils. Solidify/stabilize lead contaminated soils in accordance with ROD criteria and solidify/stabilize PCB contaminated soils above 10 mg/kg PCBs inside the fence and >1 mg/kg PCBs outside the fence;
- Amend the ROD to include above proposed change for PCB remediation; and
- Streamline design/build strategy to allow implementation of the remedial action in FY2003.

RPO Phase II evaluations were conducted in September/October 2002. In accordance with the RSV recommendations, these evaluations included soil sampling to confirm extent of PCB and lead contamination. Based on the results of these and previous sampling activities, areas of the site requiring remediation (>10 mg/kg PCBs and >1,000 mg/kg Lead inside the fence) were identified. The volume of soils requiring cleanup was estimated to be approximately 8,500 yd^3. During the field effort, tests were also conducted to evaluate effectiveness of various cement mix ratios proposed for solidification/stabilization. The cement mixes included addition of sodium hydroxide (NaOH) and tri-sodium phosphate (TSP). NaOH was added to evaluate (partial) dechlorination of the PCBs, while TSP was added to evaluate improvement in the TCLP Lead results of the stabilized materials. The results showed that addition of small amounts of TSP considerably improves the TCLP Lead results, while addition of NaOH may result in partial dechlorination of PCBs. Additional tests to verify these processes are ongoing.

During the performance of these field activities, multiple piles of potential OE materials (UXO scrap materials) were discovered at the site. These piles contained various cartridges, containers, small arms boxes, primers, rockets, and rocket launchers. Current projections indicate that more than 80,000 units of potential OE materials exist at the site. In addition, multiple transformers and gas cylinders at the site were identified. Based on the results of these Phase II evaluations, the RA implementation strategy was modified to include disposal of UXO scrap, gas cylinders, and transformers prior to soil cleanup activities. Disposal of the OE material began in November 2002, and over 110,000 lb of materials (over 7,000 items) have been disposed as of 10 February 2003. During these disposal activities, fifteen (15) active MK2A4 primers (for 155mm projectiles) and three (3) M40 series fragmentation bombs were discovered at the site.

A Work Plan has been developed to outline the proposed activities for RA implementation. A site map is presented in Figure 1. The Work Plan includes the following activities:

- Removal and decontamination of non-OE scrap for each (100 * 100') grid requiring PCB and/or Lead remediation;
- Excavation of soils (in each grid) in 6-inch layers, followed by stabilization of soils;
- Collection of pos-treatment samples to determine placement of the soils into the on-site landfill (< 50 mg/kg PCBs and < 5 mg/L TCLP Lead);
- Placement of stabilized soils in new landfill, which will overlap existing former military landfill;
- Collection and analyses of confirmatory samples in each cell; followed by
- Implementation of a GCL-based cover system for new landfill.

Results

Implementation of RPO at the Arctic Surplus Salvage Yard resulted in improved protectiveness of the selected remedy. These include:

- Mitigation of risks from OE scrap materials;
- Solidification/stabilization of soils containing >10 mg/kg PCBs demonstrates additional protection compared to current ROD requirements (no treatment of soils containing < 50 mg/kg)
- Reduced TCLP lead due to addition of TSP to stabilization mix
- Implementation of a GCL cover to minimize percolation and freeze/thaw effects

It is estimated that costs for RD/RA and 5-year monitoring at this site will be approximately 16% of the original estimate. The cost effectiveness of the selected remedy was improved due to:

- Thorough delineation of PCB and lead contaminated areas, resulting in less volume requiring treatment;
- Streamlined RD/RA strategy;
- Elimination of solvent extraction process for treatment of PCB contaminated soils;

- Implementation of one treatment process (solidification/stabilization) for treatment of PCB and Lead contaminated soils; and
- Reduced field time of r RA implementation.

If disposal costs for OE scrap materials are included, the total project costs are estimated to be 25-30% of original estimate.

Implementation of RPO recommendations will also allow for early site closeout at this facility. This is attributed to the following:

- Regulatory agency involvement throughout the RPO process;
- Streamlined RD/RA strategy resulting in quick reviews of test results and planning documents;
- Implementation of one treatment process (solidification/stabilization) for treatment of PCB and Lead contaminated soils will allow for completion of RA in one field season vs. two or three field seasons for the solvent extraction process;
- Concurrent site operations such as OE scrap disposal, gas cylinder and transformer disposal.

References

1. Mitretek Systems, *Remedial Process Optimization Scoping Visit Report, Arctic Surplus Salvage Yard*, June 2002.
2. Earth Tech, Inc., *Draft Remediation Work Plan, Arctic Surplus Salvage Yard*, January 2003.
3. United States Environmental Protection Agency, *Arctic Surplus Salvage Yard Record of Decision*, December 1995.

Figure 1: Site Map/Existing Conditions